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Number 2

MONTANA RAIL PLANNING NEWSLETTER

PREPARED BY: RAIL PLANNING UNIT, MONTANA DEPARTMENT OF HIGHWAYS

The Milwaukee Situation: Update

When the last newsletter went to press, the U.S. District Court was considering whether to allow the Milwaukee to discontinue rail service on its lines in Montana west of Miles City, effective May 31. On June 1, 1979, Judge Thomas R. McMillen, reluctantly concluded that the court could not find any statutory or authority for allowing the Trustee to carry out his proposed partial embargo of freight operations. The court emphasized that it believed the Trustee had conscientiously attempted to find a solution for the difficult problems of the Milwaukee and that the Trustee's proposal is one which would promote the public interest. While a number of avenues had been explored, the court concluded that each leads in its opinion, to a road block erected primarily by the Federal Government.

Since the decision was announced, the Trustee has indicated he would appeal the decision to the U.S. Court of Appeals. In addition, Trustee Hillman has submitted his resignation for health reasons.

Where does this leave the Milwaukee? For the forseeable future, service will continue in much the same fashion as has been provided in recent months. However in view of the continuing cash drain, a total shut down of the railroad could occur if and when present meager operating funds run out.

Energy Efficiency: Rail versus Truck

The recent energy crisis in Montana and elsewhere has once again raised questions concerning the energy efficiency of the large trucks versus rail.

First, a few simple facts. The typical tractor semi-trailer can haul around 25 tons. A rail car used on grain lines in Montana has a payload of around 67 tons. Many of the modern covered hoppers used for grain transport can hold 100 tons; however due to the "light rail" used in most branch lines and the lack of ballasting and tie renewals in recent years, railroads have imposed "load limits" on these lines. Thus, the ratio of the net tonage of a rail car to a truck is in the order of 2.5 to 1.

Energy consumed in moving freight is a function of a large number of physical parameters associated with the commodity being carried, the vehicle itself, the route or roadway and the operating environment. Typical factors are listed below:

Vehicle Related Factors

- Size and weight of rail car, truck (gross versus net)
- Type and size of locomotive, tractor
- Fuel consumption rate (usually expressed in gallons per horsepower hour).

Roadbed and Operational Factors

- Track or route profile (grades, curvature)
- Maximum/average operating speed
- Speed restrictions/stops
- Number of speed changes typically occuring

Load Factors

- Train size, consist characteristics
- Commodity weight carried per rail car, trailer
- Ton miles shipped, by commodity type

Fuel consumption for specific movements by rail and motor carrier can be calculated as a function of the vehicle's resistance to motion. The following example illustrates the use of such a method.[1]

Assume a net load of 20 tons transported between two cities 500 miles apart. Further assume that on the return trip, the rail car will be empty 40% of the time and the truck 15%. Also include allowances for drayage and the greater circuity of the rail network when compared with the highway network. Using these imputs, the calculations indicate that trucks would consume approximately 129 gallons of fuel, a trailer-on-a-flat-car 62 gallon, and a standard railcar 42 gallons in making the round trip movement.

Given detailed description of freight flows by commodity type, more precise estimates of energy consumption can be made using resistance equations. A number of techniques of this type have been developed and applied to branchline abandonments. However, it is well to remember that a short train (i.e. one having less than four cars) operating at very slow speeds is generally less energy efficient than motor carrier transport. However, the energy consumed on the branchline portion of a rail movement typically represents less than five percent of the total energy consumed.

Many railroads have developed detailed computer programs to simulate the performance characteristics for trains having varying trailing loads over different portions of their rail system. Train performance calculations provide useful estimates of running time and fuel consumption in gallons/1000 horsepower. While not as common, similar simulators have been developed to measure truck performance. While performance simulation is usually done on a route-specific basis, such techniques could be readily extended to provide answers on a system-wide basis by extending traffic assignment techniques used by transportation planning agencies.

Is rail transport generally more efficient than motor carrier transport? On a system basis, rail is three to four times less energy intensive than is motor carrier transport.[2] Whether rail is indeed more energy efficient than truck for a particular movement depends upon the specific vehicle, roadbed and operational factors involved. Thus, in times of fuel shortages. considerable fuel could often be saved by the use of rail in place of truck.

[1]NCHRP Report 177 *Freight Data Requirements for Statewide Transportation Systems Planning, Research Report.* Appendix F. Impact Estimation, Pg. 122, 1977.

[2]Energy intensiveness or energy consumption is commonly expressed in BTU's or gallons per ton-mile.

Principles Underlying Light Density Line Rail Planning

In the past, line retention decisions were usually the outcome of an advisary process in which the financial losses incurred by the railroad in operating the light density line were weighted against claims of irreparable harm and inconvenience to be experienced by shippers and the general community were rail service discontinued. Regulatory agency decisions usually reflected the strength of the arguments made for and against abandonment. Well organized opposition often resulted in decisions requiring the owning railroad to provide continuing service. even though this meant the cross-subsidation of shippers located on the light density line by others located elsewhere on that rail system.

This basis of decision making was changed through the passage of the 4R Act, which for the first time established the principle that each line must pay its own way. In recent years, regulatory agencies had found it increasingly difficult to render Solomon-like decisions reconciling at the same time, the interests of the owning railroad and those dependent upon rail service. Railroad profits had become far too small to permit the continuation of past cross-subsidation practices. Recognizing the legitmacy of local impacts caused by discontinuing rail service, the Act provided federal financial assistance to states to help them retain lines causing severe economic or social impacts were rail service discontinued. While several states in the northwest-midwest did elect to retain a sizeable number of light density lines which would have otherwise been abandoned (as a consequence of government reorganization of six bankrupt railroads), most states have been quite cautious in taking on financial responsibility for continuing rail service on light density lines for which abandonment is being sought or has been obtained - This is especially true of states in the northwestern portion of the country.

Given the above changes in the abandonment process which makes it easier for railroads to eliminate unprofitable operations, regulations have been soured by ICC prescribing advance notification for lines which may be abandoned and the type of financial accounts to be maintained on such lines. Railroads are required to periodically file with the ICC a "systems diagram map" showing (1) the lines which they intend to apply for abandonment within three years of the date of the systems diagram map, (2) lines which are under study for possible future abandonment, and (3) lines for which an abandonment application has already been filed and is being considered by the ICC. A line must be included on the systems diagram for at least four months before an abandonment application can be filed. Railroads are also required to maintain detailed branchline "attributable revenue" and "avoidable cost" data for lines identified on their systems diagrams, and to make this data available to the state rail planning agency for light density line analysis purposes.

Attributable revenues consist of income received from (1) freight originated and terminated on the branch, (2) bridge on through traffic, if any, (3) demurrage charges, and (4) other rent or miscellaneous income. The full revenue is attributed to branch, even though only a small portion of the total movement is over the light density line.[3] Avoidable costs are comprised of off and on branch costs. The former is comprised of estimated car-mile, ton-mile, and terminal charges associated with moving a carload over the remaining portions of the owning railroad's system.[4] The latter consists of numerous component costs, such as (1) maintenance of way and structures, (2) maintenance of equipment (e.g., locomotives), (3) traffic, (4) transportation, (5) taxes, (6) fringe benefits, etc. Some cost components can be determined directly through records of labor and materials spent directly on the light density line; others are a proration of system expenses using time or mileage as the porportioning factor.

To abandon a line, the main requirement is that of demonstrating the unprofitability of the line. Profitability requires that the attributable revenues exceed the avoidable costs plus a reasonable return on the value of or investment in the property (i.e., the track structure, right-of-way, etc.).

The valuation of the property has three components: (1) working capital, (2) income tax benefits, and (3) net liquidation benefits. Working capital is calculated as two week's worth of avoidable costs. Income tax benefits (or losses) represent the effect that disposal of the light density line will have on the owning railroad's income tax picture. Net liquidation benefits represent the value of track and other materials freed up for reuse elsewhere and the estimated value for the right-of-way if sold for its highest and best alternate use. The three components are added together and multiplied by the railroad's after-tax rate of return to determine a reasonable return on value for that property.

At this point, it may be helpful to characterize a typical light density line being considered for abandonment. Over the years, traffic has declined, partly due to changes in the area's economy and partly due to motor carrier competion. Service is provided on an as-needed basis. Given limited usage, track condition is often surprisingly good, although little maintenance has been performed other than essential spot repairs. By deferring maintenance expenditures and keeping operations to minimum levels, the out-of-pocket cash drain can usually be kept under control.[5]

Most light density lines were constructed in an era when alternate modes could not compete. Most were built for land access purposes, that is, to transport agricultural and mineral products to the cities and manufactured products in return. Since the 1920's, new modes of transportation (predominately trucks) have successfully competed for the more lucrative traffic, leaving the light density lines with only low-rated, bulk commodities such as grain, fertilizer, lumber, and extractive products. However, the fact that a line has little orginating or terminating traffic does not necessarily mean that it will have to be abandoned, as profitability depends strongly on the type of traffic being served and the length of haul. Even so, the lower the traffic density, the more likely the line will be marginal or uneconomic.

Many light density lines have experienced a downward cycle of declining traffic and revenues, followed by the railroad-initiated response of decreasing service and further deferring maintenance, which in turn has lead to further traffic erosion. Rising costs, inflexible operating practices, debilitated track, and changing distributive technology often results in gradually increasing light density line unprofitabliity even with stable traffic. Under free market conditions, a firm will seek to disinvest in those capital goods whose marginal cost exceeds the marginal revenue. Abandonment then is the rational process of adjusting to changed market conditions.

What this means is that prior to abandonment, shippers and communities located along the line are being subsidized in part by shippers located elsewhere on the rail system. For them, this is an ideal situation, since no social cost is incurred so long as the line remains in operation and no explicit government of shipper subsidies are required to sustain rail service. Depending upon the financial health of the owning railroad and the line's long-term traffic potential, this situation sometimes can go on for years. However, sooner or later the day of reckoning will come when the railroad will seek financial relief through abandonment, thus ending cross-subsidization. If the social costs of abandoning the line are large, the state, local communities, or affected shippers may seek to keep the line in operation through subsidizing operations or capital investment in rehabilitating the track structure. This then requires an explicit expenditure heretofore not required. Should the decision be to allow abandonment to take place, various social costs will occur as affected communities adjust to the loss of rail service. To the affected communities, these costs were held in obeyance so long as the line remained in operation.

Thus, ICC issuance of a certificate of public convenience and necessity triggers two costs which affected communities were not previously forced to consider: (1) subsidization or capital investment of continuing rail service, and (2) social costs triggered by discontinuing rail service. The latter will occur, only if rail service ceases.[6] So long as rail service is continued, these costs do not actually occur. However, once rail service is terminated, these costs are incurred as personal income is lost, transport costs increase, tax receipts decrease, and transfer payments are made. The cost of discontinuing rail service reaches its peak shortly after service termination (usually at the point of maximum unemployment) and declines thereafter. If residual unemployment and increased transport costs occur, these costs may never disappear alltogether. The general shape of the social cost curve is shown in Figure 1.

The cost of continuing rail service, which occurs ony if a deliberate decision is made to retain rail service, is comprised of some combination of capital and annual costs. Capital costs include expenditures for track rehabilitation or line acquisition.

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[3] Revenue received by the railroad owning the light density line. Does not include revenues shared with other railroads on interline movements.

[4] Does not include costs of moving the carload over the rail systems of other carriers (on interline movements).

[5] Most financially strong railroads will not press for abandonment if there is a reasonable possibility for future rail traffic. In effect, they will accept a zero return on their investment in expectation of a higher return at a later period.

[6] Many light density lines studies have used the term "benefits" to describe the economic impacts avoided by continuing rail service. Benefits are more properly defined as saving over an existing condition. Since no social costs are occurring prior to abandonment, no new benefits can be generated (from a governmental viewpoint) by either continuing or discontinuing rail service. Any decision will, therefore, cause costs to be incurred. The decision then becomes one of choosing the alternative which produces the least cost.

While such expenditures can be made on a cyclical basis, they are typically "one-time" events reflecting the infusion of government or shipper funds for the purpose of eliminating deferred maintenance and reducing annual costs.

Annual costs include expenditures for maintenance of way and structures, maintenance of equipment, traffic and transportation, tax, leasing the line (if the owning railroad is different from the operating railroad), management fees, insurance, profit, and off-branch operating costs (for other than short line railroads).

Annual costs, which include both on and off-branch cost components, are reduced by the revenues received, thus producing a net cost (avoidable costs less attributable revenues). The time patterns of capital and operating expenditures are indicated in Figures 2, 3 and 4. Capital expenditures occur occasionally and in easily-defined, often large amounts. Operating expenditures occur continuously as a function of output per unit time. Net annual costs may rise or decline depending upon the degree to which traffic and unit costs are increasing or decreasing.

State interest in abandonment stems from the potentially severe impact that affected communities may experience from cessation of rail service. A shipper essentially faces three options. He can close down his operation, initiating a series of events including primary and secondary job losses, increased governmental unemployment and welfare payments, and reduced state and local taxes. He can cut back operations that are affected by loss of rail service, while changing suppliers or market areas or taking other steps to absorb the effects of direct rail service termination. Or he can continue his operations and shift his freight traffic to trucks, possibly incurring higher shipping and materials handling costs as a consequence of mode substitution on transfer at a nearby team track. The latter option is by far the most common; in Montana, most of the impacts noted during the course of the shippers' survey stem from transport cost increases (due in part to mode substitution and in part to lower Milwaukee tariffs as compared with similar tarriffs published by the Burlington Northern) rather than employment-related effects.

Thus, one of the main tasks of state rail planning is to determine objectively what these impacts are likely to be on a line-by-line basis. The starting point is the information provided during the Rail User's Survey plus miscellaneous income and employment information from government sources.

From these inputs, initial component impacts are computed. These include:

- Changes in Transport Costs
- Net Primary Job Losses
- Secondary Employment Loss
- Out Migration
- Wage and Salary Loss
- Unemployment Compensation
- Tax Loss
- Loss in Local Purchases by Firms
- Changes in Energy Consumption
- Changes in Air Pollution (if significant)
- Changes in Noise Levels (if significant)
- Critical Bridge Impacts (if any)
- Increased Highway Maintenance Costs (if significant)
- Added Highway Capital Costs (if significant)
- Changes in Accident Levels (if significant)

Intial impacts are not a true indication of the economic effects of light density line abandonment, due to changes in the magnitude of impacts over time (See Figure 1). Thus, the cost of discontinuing rail service has to be computed over a period extending from initial cessation of service to the point that maximum impacts are reached and then extending out in time until stabilized conditions are reached.

Simultaneously, estimates of the cost of continuing rail service must be prepared. This first requires (1) determining the operating conditions and traffic levels to be examined, (2) determining attributable revenues and avoidable costs, (3) field inspection of light density lines to determine condition and (4) preparation of rehabilitation cost estimates. This information is then utilized in calculating the cost of continuing rail service under predetermined service, rehabilitation, and traffic growth scenarios.

In the end, light density line decisions must flow from an objective comparison of the cost of continuing rail service versus the cost of discontinuing rail service. The principles and process outlined above show the quantitative methods being used in reaching the line retention decisions inevitably involved in state rail planning.

FIGURE 1
COST OF DISCONTINUING RAIL SERVICE

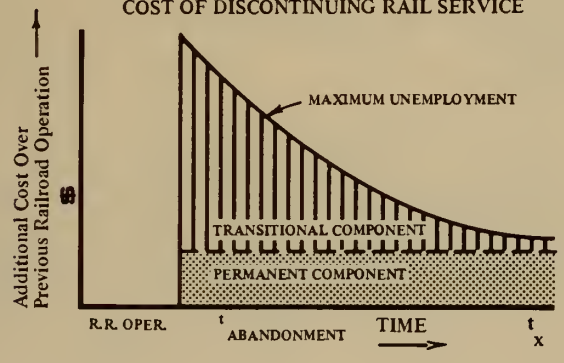


FIGURE 2
COST OF CONTINUING RAIL SERVICE (CAPITAL)

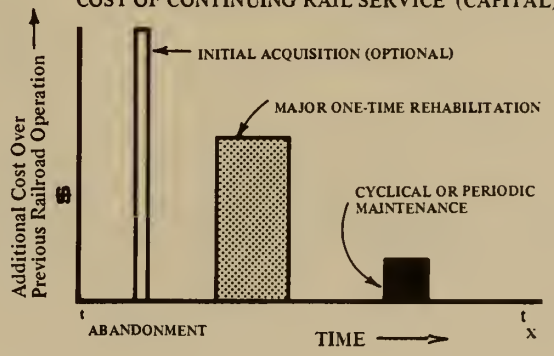


FIGURE 3
COST OF CONTINUING RAIL SERVICE
(Increasing Net Annual Costs)

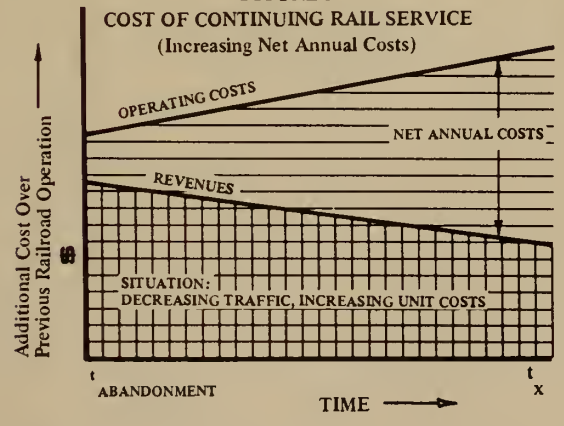
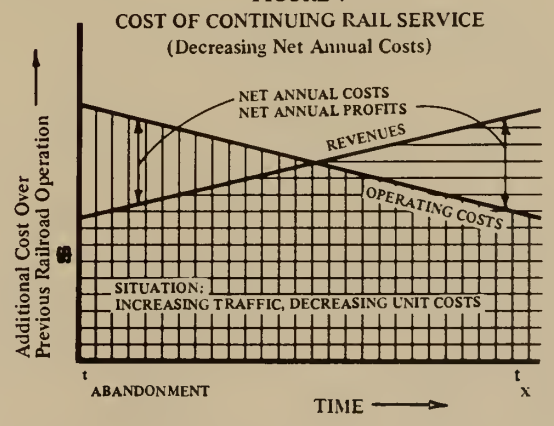


FIGURE 4
COST OF CONTINUING RAIL SERVICE
(Decreasing Net Annual Costs)



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MONTANA RAIL PLANNING

EDITORS NOTE:

This is the second edition of a bi-weekly newsletter prepared by the Rail Planning Unit of the Montana Department of Highways to keep those interested in rail planning in Montana informed of (1) the status of planning activities, (2) criteria and goals for rail service, (3) the analytical methods being utilized, and (4) findings and conclusions.

This edition is devoted largely to the analytical processes being utilized in studying the nine light density lines identified in Newsletter Number 1.

We invite questions and comments of general interest to our reading audience - We will be happy to respond to such questions through the Newsletter.

We anticipate that some of our readers have shared their copy of the Newsletter with others. If you were not included on the original mailing list but desire to receive later copies, please contact:

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